

ART. IV.—*Evidence of the Existence of a Cambrian
Fauna in Victoria.*

By R. ETHERIDGE, JUNR., CORR. MEMB.

(Curator of the Australian Museum, Sydney).

(With Plate I.)

[Read 8th August, 1895.]

Geological research has, so far, made known in Australia and Tasmania three groups of rocks believed to be of Cambrian age, as evidenced by Palæontological evidence.

The beds in question, in the order of their reported discovery, are :—

1. Caroline Creek beds, Mersey River District, Tasmania, containing Trilobites and a limited Molluscan fauna.*
2. York Peninsula Series, South Australia, and northern extension of the same in the Flinders Ranges, with Trilobites, Mollusca and a low form of Coral life.†
3. Kimberley beds, N.W. Australia, with a Trilobite, and a possible Pteropod.‡

The locality of the Kimberley fossils is not definitely known. I have searched both the late Mr. E. T. Hardman's Reports,§ without finding any record of this occurrence.

Until the appearance of Messrs. Selwyn and Ulrich's "Notes on the Physical Geography, Geology and Mineralogy of Victoria,"|| no direct reference to rocks older than Silurian in Victoria had been made. Therein Sir Alfred (then Mr.) Selwyn contented himself by remarking that westward of Melbourne "there seems to be a very gradually descending series, and towards the extreme

* See T. Stephens, Papers and Proc. Roy. Soc. Tas. for 1874 [1875], p. 27; Etheridge, Junr., *Ibid*, for 1882 [1883], p. 151.

† See H. Woodward, Geol. Mag., 1884, I. (3), p. 343; Etheridge, Junr., Trans. Roy. Soc. South Australia, 1890, xiii., Pt. I., p. 10; Pritchard, *Ibid*, 1892, xv., Pt. II., p. 179; Tate, *Ibid*, p. 153.

‡ See Foord, Geol. Mag., 1890, vii. (3), p. 98.

§ 1st and 2nd Reports on the Geology of the Kimberley District, Western Australia (folio, Perth, 1884-85).

|| Svo. Melbourne, 1866 (p. 10).

limits of the colony, west of the Grampians, a group of strata is exposed consisting of foliated micaceous and chloritic talcose, and serpentinous schists. . . . Little is yet known of the relations of these beds, and whether they represent a series older than lower silurian . . . is uncertain."

In the "Table of Geological Formations" given in Murray's "Geology and Physical Geography of Victoria"* these beds are spoken of as "Crystalline (Azoic)." He further speaks of the Lower Cambrian and Laurentian as "not yet recognised and probably not occurring in Victoria," and says: † "The metamorphic rocks of the series, among which may possibly be representatives of the Lower Cambrian and Laurentian groups, appear between the Wannon and Glenelg Rivers westward of the Grampians . . . and in the north-eastern or Omeo district . . . but in geological age they appear to be Silurian as regards the period of their deposition." From this it would appear that up to 1887 no evidence, beyond that of mere speculation, existed of true Cambrian rocks in Victoria. Sir F. McCoy, however, in 1892 published the following remarks: ‡ "Some specimens from a recently-observed group of rocks in the Heathcote district, which Mr. E. J. Dunn believed to be older than Silurian, were submitted to me to determine whether the markings were of organic origin. These were cylindrical, flexuous markings, from one to two, or scarcely three, inches in length, mineralogically different from the matrix. These markings are not organic in themselves, but are usually attributed to annelid burrows, and are common in Cambrian rocks. . . . There is no reason for supposing from these specimens that the rock is older than Cambrian or Lower Silurian." I know of no other direct evidence of the supposed occurrence of Cambrian rocks in Victoria beyond this. Quite recently, however, Mr. E. Lidgley has expressed the opinion that Pre-Silurian rocks existed within the boundaries of Quarter Sheet No. 80, N.W. (Parishes of Heathcote, Costerfield, Knowlesley), in the neighbourhood of Mount Ida, but I am not aware that this was substantiated

* Svo. Melbourne, 1887 (p. 16).

† *Loc. cit.* p. 33.

‡ Report on Palæontology of the Geological Survey for the Year 1891. *Ann. Report Secy. for Mines Viet.* for 1891 [1892], p. 30.

on anything more than mere stratigraphical evidence. Mr. Lidgey speaking of the metamorphic rocks of the area in question says:* "These rocks have already been reported on by Mr. E. J. Dunn, who classes them as Pre-Silurian," but I regret that I cannot at this moment call to mind the report of the latter gentleman. The Pre-Silurian rocks in question, Mr. Lidgey further adds, are succeeded by others of Lower Silurian age, occupying "rather less than one-fourth of the area mapped in this quarter-sheet, lying to the west of the Mount Ida Range, overlying the metamorphic rocks, and being covered on the west by glacial conglomerate (Mesozoic)." These micaceous mudstones are further stated to contain "casts of Trilobites." Whether the specimens about to be described are from the metamorphic area, or from the supposed Lower Silurian mudstones, I am unable to say, but I presume from the latter.

Again, Mr. W. H. Ferguson, reporting on the rocks at Dookie, says:† "The rocks which outcrop at Dookie township appear to belong to the same formation as a series of very ancient rocks which occur in the Heathcote district. They are quite distinct from the Silurian formation of the gold-fields, or from the granite and metamorphic rocks of the north-eastern district, or those of the county of Dundas." Lastly, Mr. James Stirling, in "Notes on the Silver Deposits and Limestone Beds of Waratah Bay,"‡ remarks that "the sedimentary deposits at Point Grinder, between Cape Liptrap and Waratah Bay, rest unconformably under [*sic*] hard felsitic rocks. . . . These may be either Silurian or Pre-Silurian." In sketch section No. 1, on the opposite page of this Report, these beds are indicated as Cambrian, pure and simple. On the next plate but one—a sketch of Waratah Bay—the same are presumedly given as Pre-Silurian, but again on the succeeding plate to this Mr. Stirling reverts to the use of the word Cambrian.

In January of last year (1894), Mr. Ferguson was good enough to forward to me a few Trilobite remains from near Heathcote, for an opinion as to their identity. In a letter, dated 19th January, he says:—"We think the rock is Lower

* Geol. Survey Victoria, Progress Report, viii., 1894, p. 44.

† Progress Report viii., *l.c.*, p. 44.

‡ *Ibid*, p. 68.

Silurian in which they occur." On 12th April of the same year Mr. Ferguson forwarded additional material, with the permission of Mr. R. A. F. Murray, Government Geologist. In this communication he remarked:—"The fossils were found and collected by myself in a very limited outcrop of shale near Heathcote. The rock is regarded by Mr. E. J. Dunn as Lower Silurian. It occurs between L.S. slates and a bed of conglomerate and breccia, and the fossiliferous U.S. sandstone beds of Mount Ida." On the 13th April, Mr. G. Lidgey kindly supplemented these fossils with others from the same locality—"N. 13° W. of Mount Ida, 230 chains."

On receiving these Trilobite remains, I at once saw that they had the aspect of very old forms, but neither the collections nor works of reference then at my command enabled me to determine their systematic position with accuracy. Grasping the fact that a very large amount of work amongst Cambrian Faunas had been accomplished by our American co-workers, I sent sketches, very carefully prepared by Mr. P. T. Hammond (late of the Geological Survey of New South Wales), to Mr. C. D. Walcott, Director of the U.S. Geological Survey, who has laboured very extensively amongst the life of these old rocks. In due time his reply came, to the effect that the "general facies of the specimens is so much like that of the Middle Cambrian Fauna, that I should not hesitate, were it found in America, to include it within it!" The sketches further impressed Mr. Walcott as representing forms such as occur in the slates of the Middle Cambrian of Newfoundland, New Brunswick, and the Rocky Mountains. In a second communication the same eminent authority observed:—"The fossils undoubtedly belong to the Middle Cambrian Fauna, as they are not of the type found in the Upper or Lower Cambrian." One of the sketches sent to him, Mr. Walcott definitely referred to the type of *Olenoides quadriceps*, Hall and Whitfield, sp., a Middle Cambrian species. This opinion, emanating from so high an authority as Mr. Walcott, cannot but have due weight.

The Trilobite remains consist wholly of portions of cephalic shields—the glabella—and pygidiums, with the exception of one or two indistinct fragments of free cheeks. They are all simply decorticated specimens, without any trace of the original test remaining, but even in this condition are fairly well preserved.

I have submitted these fossils to a most careful examination and long consideration, and having exhausted all means of comparison at my disposal, the conclusion is forced on me that they represent to us in Australia, at least, an undescribed genus. Neither do the specimens seem absolutely in accord with any of the American or European genera, descriptions of which are available. Under these circumstances, I propose describing the Heathcote Trilobites under the new name of *Dinesus*,* and the trivial appellation of *ida*, with the view of recording their place of occurrence. The combined generic and specific description will be followed by some observations on the alliances of the new genus.

DINESUS IDA, *gen. et sp. nov.*

Chars.—Cephalic shield sub-semicircular; frontal border raised, nearly straight centrally, separated from the glabella and fixed cheeks by a frontal furrow. Glabella oblong, or long oval, slightly convex, straight-sided, and rounded in front; no furrows; basal circumscribed lobes pyriform, separated completely from the glabella by deep grooves; axial grooves very wide and deep, bifurcating near the fore-end of the glabella, one branch proceeding round the latter and joining the frontal groove, the other round the fixed cheeks on each side, leaving between them and the frontal groove somewhat triangular circumscribed lobes. Fixed cheeks more or less elongately triangular, wider behind, very gently convex; eye-lobes small, slightly projecting; ocular ridges extending obliquely across the fixed cheeks to the anterior corners of the glabella; facial sutures convex in front of the eyes, curving inwards and cutting the frontal border in line with the outer edge of the fore circumscribed lobes, and, posterior to the eye-lobes convex also, dividing the posterior border of the head-shield near the position of the genal angles. Neck ring strong, convex, and devoid of a spine; neck furrow wide and flattened, the lateral furrows similar. Surface, although devoid of the test, frosted with minute granules.

Pygidium sub-semicircular to obtusely triangular, truncate behind; axis flattened, of five segments; pleuræ flattened, of a

* ἡ νησος an is'and, and δει—in allusion to the two basal circumscribed lobes.

similar number of coalesced segments, with a flattened limb produced into five or six short somewhat posteriorly-directed spines on each side.

This description, although imperfect in many respects, must suffice for the present, as it embodies all that can be gleaned from the specimens. For instance, we know nothing of the thorax, whilst the form of the free cheeks and condition of the genal angles, spined or not spined, is doubtful. The all-important points to be noted, however, are the facial sutures, simply convex before and behind the eyes, the peculiarly squarish-oblong outline of the glabella, triangular fixed cheeks, and the very straight run of the axial grooves, together with the entire absence of glabella grooves. These characters are supplemented by the presence of the anterior and posterior distinctly circumscribed lobes. The eye-lobes are certainly small and non-olenelloid in appearance. Associated with these glabellæ are pygidiums possessing few segments, and a fimbriated margin. The presence of a pleural groove is questionable.

The two pygidiums figured (Pl. I., Figs. 5 and 6) differ slightly in outline, the smaller being sharper at the anterior lateral angles, and more generally triangular in shape; this last point, however, may be only a matter of preservation. Furthermore, there are in one (Pl. I., Fig. 5) five lateral spines extending from the limb, and in the other (Pl. I., Fig. 6) six similar appendages. Possibly the two may represent distinct species, but at this early stage of the enquiry it is impossible to arrive at a satisfactory conclusion.

The above points are those it will be necessary to use in comparing the Heathcote fossils with probable allies, or genera to to which they might possibly be referable. The genera it is my intention to bring into comparison with the fossils, irrespective of horizon within the Cambrian system, are: *Ptychoparia*, Corda; *Liostracus*, Angelin; *Solenopleura*, Angelin; *Bathyurus*, Billings; *Lloydia*, Vogdes; *Olenoides*, Meek; *Protypus*, Walcott; *Avalonia*, Walcott; and *Dorypyge*, Dames.

Although the form of the glabella in some apparently aberrant forms of *Ptychoparia* is similar to that in *Dinesus*, the pronounced strength of the glabella furrows, and the direction of the facial suture in the type species, *P. striatus*, Emmrich,

sp.,* curving as it does outwards anterior to the eyes, and from the glabella, will, I think, at once debar the Victorian fossils from incorporation in that genus, to say nothing of the entire margin of the pygidium in *Ptychoparia*. It is true that in a few species of the latter a glabella and fixed cheeks occur akin somewhat to those of *Dinesus*, for instance in the Lower Cambrian *P. ? Fitchi*, Walcott.† The latter, however, departs in a very marked manner from the regular *Ptychoparia* type, and resembles our fossils in the “elongate, unfurrowed glabella, wide fixed cheeks, and granulose surface,” and apparent absence of glabella grooves.

In *Liostracus* the similarity in the square-oblong outline, and unfurrowed state of the glabella in the type species, *L. aculeatus*, Angelin, and *L. muticus*, Angelin,‡ to that in *Dinesus* is strong, but the facial suture is organised on the same plan as in *Ptychoparia*, although, perhaps, to a lesser extent. Still, there is no trace either in *Ptychoparia* or *Liostracus* of the circumscribed lobes, and the pygidium in the latter again presents an entire margin.

Solenopleura, as exemplified by the type species *S. holometopa*, Angelin,§ possesses facial sutures as different to those of *Dinesus* as those of *Ptychoparia*. But Mr. Walcott has described two doubtful species, *S. ? nana*, Ford, and *S. ? tumida*, Walcott,|| that certainly appear to be near our Trilobite, although Lower Cambrian forms, and which he admits “appear to belong to a genus distinct from the typical species of *Solenopleura*.” One in particular (*S. ? tumida*) has small circumscribed lobes at the hinder portion of the glabella, moderately straight and parallel axial furrows, and small eye-lobes, but with fixed cheeks hardly as wide as in our specimens, and no frontal furrow to speak of. *S. ? nana*, on the other hand, possesses the latter, but no circumscribed lobes. In typical *Solenopleura* the margin of the pygidium is again entire.

* See Barrande, Syst. Sil. Boheme, 1852, I., t. 14, f. 1-7; Walcott, Bull. U.S. Geol. Survey, 1884, x., t. 6, f. 4.

† 10th Ann. Report U.S. Geol. Survey, 1890, p. 650, t. 96, f. 5.

‡ Pal. Scandinavica, 1854, Pt. II., p. 27, t. 19, f. 2 and 3.

§ Pal. Scandinavica, Pt. II., 1854, p. 26, t. 18, f. 8.

|| 10th Ann. Report U.S. Geol. Survey, 1890, p. 658, t. 98, f. 1 a-c, 2, 3, 3a.

In connection with the last-named genus, a very interesting group of Trilobites described by the late Mr. Billings as *Bathyrurus** must be referred to. Unfortunately, many of the species placed by Billings in *Bathyrurus* seem to belong to other genera; certainly the earlier described species† differ a good deal from the later, although Vogdes, in his admirable "Bibliography of the Palæozoic Crustacea" (2nd edition),‡ retains most of them under the old name. Walcott, however, remarks§: "*Solenopleura* appears to be of the same character as many of the species placed under the genus *Bathyrurus* by Mr. Billings, and I think can be used for such forms as *Bathyrurus gregarius*, Billings, and nearly all the species referred to the genus *Bathyrurus* from the Cambrian."

Many of Billings' *Bathyuri*, more especially the later-described ones, such as *B. capax*, *B. dubius*, *B. Saffordi*, *B. Cordai*, and *B. quadratus*,|| possesses the same square-oblong glabella as *Dinesus*, but comparatively small fixed cheeks, and quite different facial sutures, the latter being straight and almost parallel to the axial grooves. The same objection also applies to those that I have previously mentioned in the case of other Trilobites, viz.—the entire absence of the circumscribed lobes. There is one species, however, *B. bituberculatus*, Billings,¶ that possesses these lobes at the base of the glabella, and on this account has been separated by Capt. Vogdes as a distinct genus, under the name of *Lloydia*.†† Indeed, perhaps, the before-mentioned Trilobite, *Solenopleura ? tumida*, in which the basal lobes are also developed, will fall into *Lloydia* as well, although it must be mentioned that in *S. ? tumida* there are ocular ridges, whilst in Billings' species these are not represented. In the absence of these ocular ridges and the anterior circumscribed lobes, and its perfectly concave facial sutures, *Lloydia* differs essentially from *Dinesus*.

* Pal. Foss. Canada, Pt. 5, 1865, p. 409.

† Canadian Nat. and Geol., 1859, iv., p. 364.

‡ Occasional Papers, Californian Acad. Sci., 1893, iv., p. 280.

§ Bull. U.S. Geol. Survey, 1884, No. 10, p. 36.

|| Pal. Foss. Canada, Pt. V., 1865, p. 409, 411.

¶ Pal. Foss. Canada, Pt. V., 1865, p. 409, f. 391.

†† Bull. U.S. Geol. Survey, 1890, No. 63, p. 97.

In *Olenoides*, Meek, taking the type species, *O. typicalis*, Walcott,* I fail to trace any resemblance to our fossils, for, although the glabella is square-oblong, with parallel straight sides, the furrows on the glabella are well-marked; there are no circumscribed lobes; the eye-lobes are very long, approaching those of *Olenellus*, whilst the fixed cheeks and facial sutures are quite unlike those of *Dinesus*. On the other hand, the pygidium in *Olenoides* is provided with spines along the margin. When, however, we examine *O. quadriceps*, Hall and Whitfield, sp., the form indicated by Mr. Walcott in his letters to me, the resemblance is very much stronger. There is the same almost quadrate, or square-oblong glabella, straight parallel sides, small eye-lobes, but with faint grooves on the glabella, and no circumscribed lobes. Whilst admitting a resemblance, it does not seem to me to be of that intimate character necessary for the incorporation of our specimens in the same genus with *O. quadriceps*. At the same time the latter does not strike me as possessing much in common with *Olenoides*, as typified by *O. typicalis*, Walcott.

Dames refers *O. quadriceps* to his genus *Dorypyge*;† but Walcott‡ thinks that the latter may be only synonymous with *Olenoides*. As defined by its author, *Dorypyge* possesses three pairs of glabella furrows, and a facial suture not unlike that of my proposed new genus, but without any trace of circumscribed lobes. On the other hand the margin of the pygidium, as in *Dinesus*, is spined, and closely allied to that of the latter. As regards *Dorypyge* generally, Mr. Walcott makes the following remarks:§ “I have placed the two species|| under the genus *Olenoides* while waiting for proof of the character of the border of the pygidium of the genus. I have very little doubt of its being spinous, and if it is so, the species described by Dr. Dames will probably fall within its limits, and the genus *Dorypyge* be placed as a synonym of *Olenoides*. In the event of *Olenoides nevadensis* being generically distinct from *Dorypyge Richthofeni*,

* Bull. U.S. Geol. Survey, 1886, No. 30, p. 183, t. 25, f. 2. The actual type of the genus is *O. nevadensis*, Meek, but of this the cephalic-shield is unknown.

† Richthofen's China, 1883, iv., p. 23.

‡ Bull. U.S. Geol. Survey, 1886, No. 30, p. 222.

§ Bull. U.S. Geol. Survey, 1886, No. 30, p. 222.

|| *Olenoides quadriceps*, H. and W., and *O. wahsatchensis* (= *Dikelocephalus gothicus*, H. and W.)

Dames, then *Olenoides typicalis*, *O. Marcoui*, *O. spinosus*, *O. levis*, *O. flagricaudus*, *O. expansus*, *O. quadriceps*, and *O. wahsatchensis* may be referred to the genus *Dorypyge*." It will be observed that Mr. Walcott here suggests the possibility of *Olenoides quadriceps*, the presumed ally of our Heathcote fossils, being a *Dorypyge*.

Protypus, Walcott,* is another peculiar genus. One of its species, *Bathyrurus senectus*, Billings,† resembles our fossils quite as much as does *Olenoides quadriceps*, although the type of the genus, *P. Hitchcocki*, Whitfield,‡ does not. In *P. senectus* we observe the same peculiar glabella, fixed cheeks, and small eye-lobes, but there is neither frontal groove, circumscribed lobes, nor ocular ridges. The pygidium of this species is unknown, but in the type of the genus it is small, and with an entire margin.

Avalonia, Walcott, with *A. manuelensis*§ as its type, although a Lower Cambrian form, may be referred to in passing from the similarity of its glabella to that of *Dinesus*, but three pairs of grooves are said to be present, and possibly a long narrow eye-lobe, as well as a peculiar narrow furrow on each fixed cheek between the axial grooves and the facial sutures, occupying the position of the ocular ridges.

Lastly, from *Protolenus*, Matthew,* the new genus differs much in the same way as from *Ptychoparia*, except that, as in the latter, the eye-lobes are short and small.

It may be that I have laid too much stress on the presence of the supplementary circumscribed lobes, but these, taken in conjunction with the form of the glabella and fixed cheeks, small ocular lobes, and the direction of the facial sutures, lead me to regard these Victorian Trilobites as generically distinct, not only from *Olenoides*, the genus suggested by Mr. Walcott, but also from any others I have been able to study through the works of reference at my command.

* Bull. U.S. Geol. Survey, 1886, No. 30, p. 211.

† Bull. U.S. Geol. Survey, 1886, No. 30, p. 211, t. 31, f. 2, a-c.

‡ Bull. U.S. Geol. Survey, 1886, No. 30, p. 211, t. 31, f. 4.

§ 10th Ann. Report U.S. Geol. Survey, p. 646, t. 95, f. 3, 3a.

|| Bull. Nat. Hist. Soc. N. Brunswick, 1892, No. 10, p. 34.

How far the presence of *Dinesus* alone will tend to prove the occurrence of a Cambrian area in Victoria, future research in the field must prove, but it lends colour to such a suggestion, and this is supported by the association of the Trilobites with a little Brachiopod of a decidedly Cambrian type. This will be referred to again.

Touching the other Trilobites of Cambrian age that have already been described from Australian rocks, the following remarks may be made:—No relation exists between *Dinesus* and *Protolenus Forresti*, Foord, from the Cambrian rocks of Kimberley, nor is it directly related to either of the species from the Parara Limestone of Yorke Peninsula, South Australia, viz.: *Ptychoparia australis*, Woodw., *Dolichometopus* ? *Tatei*, Woodw., *Olenellus* ? *Pritchardi*, Tate,* or *Microdiscus subsagittatus*, Tate.

The Tasmanian species from the Caroline Creek series are much more difficult of comparison from their poor state of preservation. Amongst them there seems to be a *Ptychoparia* or *Protolenus* (*P.* ? *Stephensi*, Eth. fil.), and a possible *Dikelocephalus* (*D.* ? *tasmanicus*, Eth. fil.), with several other peculiar forms. Of the latter, little definitely can be said at present, for my paper† was founded on very poor and indefinite material, as evinced by the fact that I did not attempt to name the glabellæ (for such is their nature) in question. There is now, however, this amount of interest about them, that in all four the glabella is very much akin to that of *Dinesus*, but two possess well-marked furrows; a third has circumscribed basal lobes and no furrows, and may possibly be allied to Vogdes' *Lloydia*; whilst the fourth is furnished with neither lobes nor furrows of any kind. There for the present the comparison must rest.

The little Brachiopod referred to on a previous page consists of the specimen and its counterpart. It is quadrate in form, and measures only 7 mm. in length. It probably represents the two valves crushed together, with a nearly horizontal hinge line, and showing through the substance of the shell a strong septum, probably that of the dorsal valve. It is covered with very delicate concentric lines, representing the original sculpture of

* This Trilobite seems to me hardly separable from *Dolichometopus Tatei*, Woodw.

† Papers and Proc. Roy. Soc. Tas. for 1882 [1883], p. 156, t. 1, f. 8-11.

the surface. A tentative opinion, however, can only be passed as to the identity of this little fossil; but on passing in review the lower forms of Brachiopod life, one is struck with the resemblance, in a general sense, with two genera described by Dr. Waagen from the Cambrian series of the Salt Range, India, viz.—*Neobolus** of the family Obolidae, and *Lakhmina*, Oehlert;† a member of the Trimerellidae. No trace of internal structure being preserved in our fossil beyond a septum, as previously stated, it is impossible to decide satisfactorily to which of the two it is most nearly allied. Viewed exteriorly, the resemblance to *Lakhmina linguloides*, Waagen,‡ is very strong, particularly in the form and sculpture. It is, therefore, quite possible that it may be referable to this curious genus. At any rate, it is a form entirely new to Australian Palæontology, and I am much indebted to my assistant, Mr. W. S. Dun, for the trouble he has taken in unravelling its possible affinity.

The drawings have been executed with care and exactitude by Mr. Edgar R. Waite, to whom I also beg to express my thanks.

DESCRIPTION OF PLATE.

Dinesus ida (Eth. fil.).

Fig. 1.—Glabella and fixed cheeks, with circumscribed lobes, frontal border, neck-ring, and ocular ridge on the left fixed cheek.

Fig. 2.—A smaller but similar specimen.

Fig. 3.—Glabella and fixed cheeks, with the anterior circumscribed lobes, and the left ocular lobe.

Fig. 4.—Specimen similar to Fig. 1, somewhat obliquely pressed, showing distinctly the left eye lobe and ocular ridge.

Fig. 5.—Pygidium of five coalesced segments, but wanting the posterior apical margin. The limb is produced into five spines.

* Pal. Indica (Salt Range Fossils), 1885, I., Pt. 4, fas. 5, p. 756.

† Waagen, *loc. cit.*, 1889, iv., Pt. I., p. 81; 1891, iv., Pt. 2, t. 2, f. (= *Davidsonella*, Waagen, non M. Chalmas, *ibid*, 1885, I., Pt. IV., fas. 5, p. 761.

‡ *Loc. cit.* 1891, iv., Pt. II., t. 2, f. 3 and 4 (= *Davidsonella linguloides*, Waagen, *ibid*, 1885, I., Pt. IV., fas. 5, p. 764, t. 85, f. 3-6.

Fig. 6.—A smaller and somewhat more triangular tail, also of five segments, but with six lateral spines.

Fig. 7.—Pustular ornamentation of the glabella and fixed cheeks.

Lakhmina ? sp.

Fig. 8.—One or two (?) compressed valves showing a strong septum through the test, also a fine concentric line sculpture.

Figs. 1, 6, and 7 are magnified twice.

Fig. 8 highly magnified.
